A Novel 3-D Engineered Solution for Congenital Microtia of the Ear

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The purpose of this experiment was to analyze the effectivity of 3D constructed external ears in conducting and transmitting various frequencies (Hz) and intensities (dB) of sound. This procedure was used to develop a novel solution for individuals suffering from congenital conducive Grade 3 Microtia or Anotia in order for them to completely restore hearing. Currently, surgical methods and implantations to repair ear malformations and return hearing to these individuals have proved to be insufficient in time efficiency, physical appearance, and significant auditory restoration. A diverse collection of ears were constructed with different techniques including the utilization of an engineering 3D ABS plastic printer, plaster, silicone, and latex molding. The conductivity of each of the artificial external auditory meatuses was tested with an acoustic box. Similarly, the ability for each of the artificial auricles to direct outside sounds into the canal was assessed with a larger constructed acoustic test box. A range of frequencies and intensities were played and the exiting sound from the artificial ears was collected with various computer applications including Audacity, Spectrum View ®, and Decibel 10th. The best ears were determined to be the Silicone, Latex, and Alginate auricles by comparing levels of sound entering and exiting these mechanisms. The solution will prove to be more efficient in conducting sounds, preventing rejection, and being more physically similar to a human ear to give a higher quality of life.

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